

REMARKS/ARGUMENTS

Claims 1 and 3-23 are pending in the present application. Claims 1 and 5 have been amended. In response to the Examiner's request, Applicants are submitting new corrected drawings including changes shown in the proposed drawing corrections submitted on August 14, 2002. The amendments do not add new matter and find support throughout the Specification and Figures.

Claim 14-18 have been withdrawn as the result of an earlier restriction requirement. In view of the Examiner's earlier restriction requirement, Applicants retain the right to present claims 14-18 in a divisional application.

Claims 1, 3-13, and 19-23 stand rejected under 35 U.S.C. § 103(a). It is respectfully submitted that all of the presently pending claims are allowable for at least the following reasons.

35 U.S.C. § 103(a)

Claims 1, 3-5, 7-13, and 19-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over United States Patent No. 5,393,351 to Kinard et al. (Kinard) in view of United States Patent No. 5,703,287 to Treutler et al. (Treutler). Applicants respectfully submit that claims 1, 3-5, 7-13, and 19-22 are in condition for allowance for at least the following reasons.

In order for a claim to be rejected for obviousness under 35 U.S.C. § 103(a), not only must the prior art **teach or suggest each element of the claim**, but the prior art must also **suggest combining the elements in the manner contemplated by the claim**. See Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 934 (Fed. Cir. 1990), cert. denied, 111 S. Ct. 296 (1990); In re Bond, 910 F.2d 831, 834 (Fed. Cir. 1990). The Examiner bears the initial burden of establishing a *prima facie* case of obviousness. M.P.E.P. §2142. To establish a *prima facie* case of obviousness, the Examiner must show, *inter alia*, that there is some **suggestion or motivation**, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, **to modify or combine the references** and that, when so modified or combined, the prior art **teaches or suggests all of the claim limitations**.

M.P.E.P. §2143. Applicants respectfully submit that these criteria for obviousness are not met here.

Amended independent claim 1 recites a mass flow sensor that includes, *inter alia*, a frame, a metal layer including a first structure and a second structure and being arranged above the frame, a heating element formed by the first structure in the metal layer, at least one temperature measurement element formed by the second structure in the metal layer, and **a moisture barrier arranged above the metal layer** and formed at least in part by a nitride layer. Amended claim 1 further recites that **the moisture barrier is formed at least in part by a top sandwich system including at least one first silicon oxide layer and at least one first silicon nitride layer**. As stated in the specification, the stability of the membrane of a mass flow sensor may be improved, for example, by arranging a moisture barrier above the metal layer of the mass flow sensor, as recited in claim 1. (Specification; page 1, ll. 12-14). In addition to providing improved stability, the moisture barrier is operable to reduce an amount of damaging moisture that may reach the membrane of the mass flow sensor. (Specification; page 1, ll. 17-20). For this purpose, the moisture barrier may include, for example, a nitride layer produced by an LPCVD or PECVD process, or a silicon carbide layer produced by a PECVD process. (Specification; page 2, ll. 1-5).

The Office Action asserts that the feature of the moisture barrier being arranged above the metal layer and formed at least in part by a top sandwich system including at least one first silicon oxide layer and at least one first silicon nitride layer is taught by Kinard. Specifically, the Office Action cites Figure 1 of Kinard in support of the assertion that the claimed features relating to the moisture barrier are disclosed in the prior art. (Office Action; page 4, line 14 to page 5, line 2). Applicants respectfully submit that Figure 1 of Kinard contains none of the elements discussed in the Office Action (*e.g.*, elements 268, 260, 264, and 262). However, Applicants will discuss Figure 3 of Kinard in connection with this rejection, since Figure 3 of Kinard does include the elements discussed in the Office Action. With regard to Figure 3 of Kinard, even if element 208 discloses a metal layer as alleged in the Office Action (Office Action; page 2, ll. 17-18), with which assertion Applicants do not agree, **the top sandwich system** identified by the Office Action as being constituted by element 264 and element 262 (Office Action; page 4, ll. 18-20) is not arranged **above** element

208. The Office Action identifies the top sandwich system as being arranged above element 260. (Office Action; page 2, ll. 16-18). However, element 260 of Kinard is composed of silicon dioxide, as identified from the legend in Figure 3, or is a silicon oxide layer, as identified in the related text. (Kinard; col. 10, line 63). Therefore element 260 cannot be considered to be a metal layer, in particular a metal layer including a heating element and a temperature measurement element, and therefore the elements identified by the Office Action as comprising the top sandwich layer (elements 262 and 264) are not arranged **above the metal layer**, as recited in claim 1.

The addition of Treutler fails to cure this critical deficiency. Though Treutler apparently discloses a silicon nitride layer, there is no indication that a moisture barrier including a top sandwich system is discussed, or that **a top sandwich system includes a silicon nitride layer and a silicon oxide layer**. Therefore, neither of the references discusses, or even suggests, a moisture barrier arranged above a metal layer and including a top sandwich system that includes a silicon nitride layer and a silicon oxide layer. Therefore the combination of applied references does not render unpatentable the subject matter of amended claim 1.

Additionally, it is respectfully submitted that there is no suggestion in the prior art to modify Kinard in view of Treutler in order to arrive at the invention of claim 1. The Examiner asserts that it would have been obvious to employ in Kinard the teaching of Treutler. Specifically, the Examiner states that “[i]t would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the thermal detector of Kinard utilizing the teachings of the sensing elements of Teutler (sic) et al. by providing it with a protective layer arranged over their metallic elements to insulate and protect the metallic detectors and emitters from hazardous environmental conditions therefore making said detector more reliable and durable, and by arranging both the heater and the temperature sensing elements being in a metallic layer to further increase the reliability and accuracy of said meters by protecting it from damage.” (Office Action at page 3, ll. 10-19). However, this type of conclusory reasoning for the modification of the applied references is insufficient to sustain an obviousness rejection. Kinard and Treutler, as a whole, give no suggestion of the usefulness of a combination with the passivation layer or the single metal layer apparently

discussed in Treutler. The only motivation to combine the references comes from the disclosure of the Applicants, which constitutes improper hindsight reasoning. Since there is no motivation or suggestion to combine the references, the references do not render the subject matter of claim 1 obvious.

Claims 3-5 and 7-13 depend from claim 1 and are therefore allowable for at least the same reasons that claim 1 is allowable.

Claim 19 relates to a mass flow sensor that includes, *inter alia*, at least one of a top sandwich system including at least one first silicon oxide layer between at least two first silicon nitride layers formed above the metal layer and a bottom sandwich system including at least one second silicon oxide layer between at least two second silicon nitride layers formed below the metal layer. There is no disclosure in Kinard of a silicon oxide layer between two silicon nitride layers being arranged above or below a metal layer. The Office Action cites element 208 as the metal layer and element 262 and 264 as the top sandwich system, with element 262 as a silicon nitride layer and element 264 as a silicon oxide layer. (Office Action; page 5, line 19 and page 6, ll. 6-8). However, elements 262 and 264 are arranged below element 208 (*see* Kinard, Figure 3). The Office Action's reference to element 260 is simply not understood since, as noted above, element 260 is a silicon oxide layer that does not include structures of a heating element and a temperature measurement element. Additionally, there is no disclosure in Kinard regarding two silicon nitride layers sandwiching a silicon oxide layer and arranged above (or below) a metal layer, as recited in claim 19. Therefore, Kinard does not disclose these claimed features of claim 19.

The Office Action relies on Treutler only for apparently disclosing a silicon nitride layer above a metal layer. It is respectfully submitted that a silicon nitride layer does not teach a top sandwich system including a silicon oxide layer between two silicon nitride layers used as a moisture barrier as recited in claim 19. Therefore, the addition of Treutler does not cure the critical deficiency of Kinard. For at least these reasons, claim 19 is allowable over the combination of Kinard in view of Treutler.

Claims 20-22 depend from claim 19 and are therefore allowable for at least the same reasons that claim 19 is allowable.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kinard in view of Treutler as applied above to claims 1, 8, and 9, and further in view of United States Patent No. 5,965,811 to Kawai et al. (Kawai).

Claim 12 depends from claim 1. The Office Action does not rely on Kawai for disclosing, and Kawai fails to disclose, the feature of a moisture barrier arranged above the metal layer and formed at least in part by a top sandwich system including at least one first silicon oxide layer and at least one first silicon nitride layer, as recited in amended claim 1. Therefore, it is respectfully submitted that the addition of Kawai does not cure the critical deficiency of Kinard and Treutler. For at least these reasons, claim 12 is allowable over the combination of Kinard, Treutler, and Kawai.

Claims 6 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinard in view of Teutler as applied to claims 5 and 19 above, respectively, and further in view of United States Patent No. 5,852,239 to Sato et al. (Sato).

Claim 6 depends from claim 1. Furthermore, the Office Action does not rely on Sato for disclosing, and Sato fails to disclose, the claim 1 feature of a moisture barrier arranged above the metal layer and formed at least in part by a top sandwich system including at least one first silicon oxide layer and at least one first silicon nitride layer. Accordingly, the addition of the Sato reference does not cure the previously-discussed critical deficiency of Kinard and Treutler as applied against parent claim 1. For these reasons, Applicants respectfully submit that dependent claim 6 is allowable over the combination of the applied references for at least the same reasons discussed above in support of the patentability of claim 1.

Independent of the above, none of Kinard, Treutler, and Sato, whether considered individually or in combination, discloses a moisture barrier “formed at least in part by at least one of a top sandwich system and a bottom sandwich system,” in which “at least one of the top sandwich system and the bottom sandwich system includes at least one silicon carbide layer,” as recited in claim 6. As regards Kinard, Treutler, and Sato, these references do not disclose or teach the use of silicon carbide for any purpose whatsoever, much less for the purpose of providing a “moisture barrier.” As regards Sato, although this reference discusses the etching of a silicon carbide layer to form three heating elements, the reference fails to

disclose the use of silicon carbide to form a **moisture barrier** arranged above a metal layer. Considering that the primary purpose of a moisture barrier, e.g., a moisture barrier made of silicon carbide, is to prevent the penetration of moisture into the sensor membrane, etching the silicon carbide layer of Sato to produce the heating elements would presumably permit moisture to penetrate the substrate of Sato. That is, after the silicon carbide is etched away, moisture may penetrate the substrate of Sato in areas not occupied by the heating elements. As such, the etched silicon carbide of Sato cannot be considered a “moisture barrier” made of silicon carbide, as recited in claim 6.

Since none of Kinard, Treutler, and Sato discusses the use of a silicon carbide moisture barrier, there is simply no motivation, suggestion or expectation of success to modify Kinard, Treutler, and Sato with the silicon carbide layer of Sato in the manner contemplated by claim 6. For at least these additional reasons, claim 6 is allowable over the combination of Kinard, Treutler, and Sato.

Claim 23 depends from claim 19, and the addition of Sato does not cure the critical deficiencies of Kinard and Treutler as applied against parent claim 19. Therefore, claim 23 is allowable over the applied references for at least the same reasons that claim 19 is allowable. Additionally, claim 23 recites the additional features that at least one of the top and bottom sandwich systems includes a silicon carbide layer. As discussed above in support of allowability of claim 6, since none of Kinard, Treutler, and Sato discusses the use of a silicon carbide moisture barrier, there is simply no motivation, suggestion or expectation of success to modify the teachings of Kinard, Treutler, and Sato with the silicon carbide layer moisture barrier in the manner contemplated by claim 23. For at least this additional reason, claim 23 is allowable over the applied references.

For at least the reasons discussed above, withdrawal of the rejections under 35 U.S.C. §103(a) with respect to claims 1, 3-13, and 19-23 is hereby respectfully requested.

Reply to Office Action of January 14, 2004
Attorney Docket No.: 10191/1616

CONCLUSION

Applicants respectfully submit that all of the pending claims of the present application are now in condition for allowance. Prompt reconsideration and allowance of the present application are therefore earnestly solicited.

Respectfully submitted,

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